AERODYNAMICS BUILDING.

WAR FACTORIES AND SHEDS: THEIR CONSTRUCTION AND ADAPTATION TO FUTURE NEEDS.

By SIR FRANK BAINES, C.B.E., M.V.O.

Abstract of a Paper read before the Royal Institute of British Architects, 17th March, 1919.

PART II.

IN my previous address, those of you who were present may remember that I dealt principally with the design of factories concerned with manufacturing the constituents of high explosive, and with the filling, inspection and storage of H.E. shells. I propose this evening to give you brief particulars relating to factories employed in the filling of gas shells and in submarine-mine filling, and to illustrate the technical processes which had to be studied before the buildings could be planned, and the adaptations and improvisations which were carried out in response to the rapid development of modern warfare.

There are certain special buildings, too, which deserve description because of the interesting and exceptional functions which they performed in the prosecution of the war.

This has been rightly described as an engineers' war, and for this reason it has been inevitable that the essentially engineering aspect should predominate in the buildings which I am illustrating and describing. I have referred to the close association necessitated between the architect and the engineer, and to the value of a co-operative office at such a crisis in the affairs of the nation, but the contexture of these professions must have been far more obvious from the illustrations which I have been enabled to present on the screen, and I have dealt rather fully with the process operations conducted in each building because this is the real key to the problem of planning. For architecture, as ordinarily understood, there was, of course, the very smallest occasion, and any superficial veneer of "trimmings"—frequently superfluous even in piping times of peace—was, of course, quite out of the question under war conditions.

What architecture there was had to be *organic*, and I am strongly of opinion that the architect's special training fits him pre-eminently for the planning and construction of complicated industrial buildings. I have the profoundest respect and admiration for the engineer and his achievements, but I feel that building construction of every description is the proper province of the architect: concrete and bricks, timber, and even steel, are his birthright, and he handles them differently, but not less efficiently, in consequence of an entirely different training, and the resultant attitude of mind.

Assembling Station for Chemical Shell.

Object of the Station.

The work to be performed at this station may be described in general terms as :—

(*a*) The reception and storage of shell already filled with chemical.

(*b*) Filling the heads of the shell with burster charges.

(*c*) Painting the shell, preparing it for despatch, and despatching the completed shell.

Nature of Accommodation.

(*a*) *For the reception and storage of shells.*—Shells arrive principally by rail, but also by road in motor vans, and by canal in barges, and the receiving shed was so situate as to be readily accessible to all these sources, and also to the workers arriving by road.

The floor level corresponded with that of the railway trucks and the floor area, 200 ft. by 40 ft., was calculated for the accommodation of 40,000 shells at 120 ft. super per 1,000, stacked six rows high, requiring 6,000 ft. super nett, with provision for extension if required. The shells are examined on arrival, before removal from the truck, van, or barge, and only those passed are unloaded and stored, the defective shell being transported to a special shell hospital set apart and equipped for further examination and remedying defects.

Transit of the shell is effected by means of trollies, the surface of which corresponds with the height of the counter and benches, in order that the shell may be rolled into position and lifting obviated.

(*b*) *For filling the heads of the shell.*—This work is carried out under danger conditions, and the buildings are within what is called the danger area, provision is therefore made to prevent all access to this area except through a building in which workers change their clothes and undergo search.

The filling sheds are spaced 200 yards apart and consist of two parts, a receiving room 16 ft. by 7 ft., and a filling room, 16 ft. by 20 ft. Trollies bringing shells from the receiving shed enter the receiving room of the filling shed, from which there are two doors entering the filling room, respectively for reception and despatch of the filled shell. The filling room is equipped with a working bench and a stacking bench and is well ventilated, steam-heated and artificially lighted with protected lights, and provided with an emergency exit, the floor surface being easily washed and kept free from dust.

(*c*) *Painting, inspecting and despatching the shell.*—A well ventilated and lighted shed is required for these operations, so placed as to afford facility for delivering the shell directly into trucks, vans or barges. A floor area of 12,000 ft. super, with provision for extension, was necessitated.

This building is not in the danger area and workmen have direct access thereto after passing the main gate.

Subsidiary Buildings.

These are divided into two categories—non-danger and danger. In the first-named category are :—

(1) The gate house, containing day and night watchman's accommodation, turnstiles, and checking clock for workmen.

(2) The manager's office, containing manager's room, chemists' room, and assistant manager's room, accountants', clerks', and pay offices.

(3) Latrine accommodation.

(4) Canteen, with seating accommodation for 170 men and 170 women in separate messrooms, with serving counter and central kitchen, scullery with counter for "dirties," larder, and store. Separate messrooms being provided for official and canteen staffs.

(5) Boiler house.

(6) First Aid station, doctors' and patients' rooms, and lavatory accommodation.

(7) General store, and store for rescue apparatus, helmets, stretchers, etc.

(8) Inspector's office, near despatching shed.

In the danger area are :—

(1) *Changing rooms.*—Affording accommodation for 250 workers, divided for men and women, and providing for extension, and so planned that no worker, male or female, can pass to the filling sheds except under supervision.

(2) Latrine accommodation.

(3) Magazines for the storage of explosives, connected by trolley-ways with the general system.

A further factory, constructed primarily for lyddite filling, which was used successively for mine filling, shrapnel filling, and chemical filling, was next described. It was designed on the unit principle, the buildings consisting of men's and women's changing-houses, with bath and lavatory blocks, two bonded stores, 20 picric acid stores, sling shed, 4 sifting, 22 filling, and 8 melting-houses, empty shell and general stores, 2 magazines, transit sheds, laundry, clean and dirty-ways, offices, guard-room, canteen, time and pay office, boiler-house, loco shed, pump-house, and Army Ordnance Depôt. The danger buildings were isolated by means of earthwork revetments built of material excavated in the construction of submerged railway sidings, approximately 50,000 cubic yards being utilised for the purpose.

Plans were commenced on January 4th, 1916, and completed in ten days, tenders being invited and the contract let on January 24th, when transit of the builders' plant commenced, and the work of inserting points and crossings in the main railway line, and construction of the sidings on the factory site began.

Within twelve weeks from commencement the requisite number of buildings were completed and handed over, and the work of melting picric acid and the filling of shells begun. The estimated capacity of each unit was 100 tons of melting and filling per week, but with improvements rapidly effected this

output was exceeded by from 50 to 75 per cent., while the cost of production was reduced.

Some two million bricks and fifteen hundred standards of timber were used in the construction of this factory.

In the first instance it was arranged that the picric acid should be melted in three concentric copper vessels, in shape resembling an ordinary washing copper ; oil was filled between the outer and intermediate vessels and heated by gas flame underneath, the picric acid being placed in the innermost chamber, which was removable, about 80 lb. of picric being dealt with in each melt.

The inefficiency of this process soon became manifest, as the vessel containing the picric was insulated by an air space from the heated oil, and much of the heat was lost by radiation.

There appeared to be no reason why the vessel containing the picric should not be placed directly in the oil, and there seemed to be no justification for making the whole outfit of copper.

It was decided, therefore, to heat the oil in ordinary galvanised tanks, and to heat the picric in copper or aluminium vessels, called " cans," shaped more or less like ordinary water-pans, but with a pouring-lip in place of the spout.

The tanks were constructed to take ten cans, each holding 30 lb. of picric, making 300 lb. in all for each melt. The burners were placed in the lower chamber in the tank, no communication being permitted between this chamber and the air of the melt-house, air for combustion being drawn entirely from outside.

Small glass windows were placed in the ends of this combustion chamber in order that the girls in the melt-house could keep the gas jets under observation and ascertain if these were burning properly. To facilitate this examination sloping mirrors were placed in front of the windows, in order that the girls could see the jets in operation at a glance.

In the earlier process each tank cost about £120, whereas in the later process the cost was reduced to about £40, while at the same time the output was more than doubled and the gas consumption reduced by one-half. That this result was achieved without undue risk is proved by the fact that in three years no single fatal accident or serious fire resulted at this and another large factory in which the apparatus was installed.

Picric melts at a temperature of about 270° F., the temperature varying slightly with different qualities ; but in order to enable the can to be carried from the melt-house to the filling house the temperature has to be raised to about 330° F., the oil in the tanks being maintained at about 370° F.

It is well known that the most economical method of utilising coal is to gasify it completely in what is known as a gas producer plant ; and at one of the larger and more permanent factories a plant was laid down for obtaining producer gas from anthracite fuel.

This plant is the largest in the country for the production of gas by this method, for consumption in heating process, although larger plants exist for supplying gas to gas engines. The process of using this type of gas as a heating agent had not, in fact, been fully developed before this particular war factory was constructed, and numerous experiments were necessitated before obtaining successful burners.

Filling Station for Submarine Mines or " Sinkers."

The site of this factory, situated in open country, adjoined one of the main-line railways and connection was made to an existing siding, to which a marshalling-grid, consisting of five lines 800 feet long, was attached at some distance from the main line. Adjoining the grid a separate siding was put down, with a halt for passenger traffic to the factory. From the grid two sidings were run to the north and south sides of the factory respectively, the former serving the magazines and ammunition store, and the latter being used for transporting the mines, which are lifted by steam crane from the railway wagons on to trucks of the narrow-gauge track. This line also served the boiler-house, generating-house and general store.

A 30-foot roadway was constructed to give road access to the factory, extending to the administrative blocks, etc.

Footpaths were provided from here to the factory buildings. From the crane track three lines of narrow-gauge railway were provided for the conveyance of the empty mines to the filling or melt-houses, which were 200 feet away ; and the track was continued through the filling house for a further distance of 200 feet to provide standing space for cooling purposes. Four magazines were provided, each 80 feet by 30 feet, suitable for the storage of 100 tons of T.N.T., with covered platform at one end in addition, so that the T.N.T. could be unloaded direct from the trucks and conveyed to the expense magazines without passing through the magazine. Expense magazines with 10 compartments were provided to each unit, each compartment having a capacity of 1½ tons of T.N.T. The expense magazines were connected with the main magazines by a clean platform ; and unheading-houses were provided between the expense magazines and the filling houses. Two empty box stores were situate between the magazines, the distance from same being 300 feet.

Lavatories were provided for men and women adjoining the filling houses and also the magazines. Small change-rooms were also incorporated in the plan of these buildings for the changing into factory shoes, etc., the main changing house being placed with the administrative buildings, where further lavatory accommodation was provided.

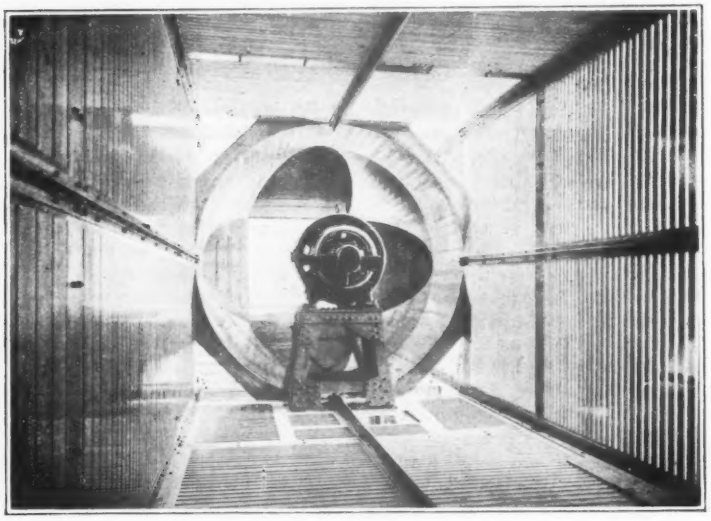
The construction of the buildings generally was of steel framing, the roof principals being covered with corrugated iron, with asphalt floors to the magazines. The filling houses were of fireproof construction, brick being selected as the most suitable material.

The engineering services included the heating and lighting of the administrative buildings, together with cooking appliances for the canteen, etc., also a small amount of heating in the danger buildings and melt apparatus, etc., for the process work.

The fire service consisted of pump-house, built at low level, with a reservoir, adjoining the existing land drain; sprinklers and hydrants were provided, and cold water service by means of a 9-inch main run from an adjoining village. An elevated tank was provided in connection with this service to give pressure and storage.

The generating station consisted of two complete steam generating sets and switchboard, the steam being obtained from the Lancashire boilers, which provide the heating. Electric light mains, etc., were run to the various buildings by means of overhead cables on poles.

Each melt-house was fitted with three melt-pots, with the necessary hoist for each pot.



Aerodynamics Building.

Aerodynamics Building.

Of various buildings erected during the war one of the most interesting is perhaps the aerodynamics building for the Aeronautical Department, in which experiments are made upon scale models of aeroplanes, airships, and also component parts, which are held by various means in the wind current in specially designed tunnels, the forces due to the wind being measured by balances. These experiments provide the necessary data for calculating the performance and stability of the full-size machines.

Before the outbreak of war, the equipment in this department consisted of three wind tunnels, respectively 3 ft., 4 ft., and 7 ft. square in cross section.

Owing to the pressure of work in 1915, it was found necessary to provide further equipment, and a building was erected to house a second 7-ft. tunnel and also a second 4-ft. tunnel, together with the electrical plant required to run them. Adequate office accommodation, a pattern shop, and model-making shop were also included in this building. Towards the end of 1917, however, it was found necessary to increase still further the accommodation for this important service, and an additional large building was erected. The plan of this building includes an administrative office block and three floors, a large workshop for making models, a motor and generating house, battery room and two other rooms for the third 7-ft. tunnel, and a still larger wind tunnel of special design, with a rectangular working section 7 ft. by 14 ft.

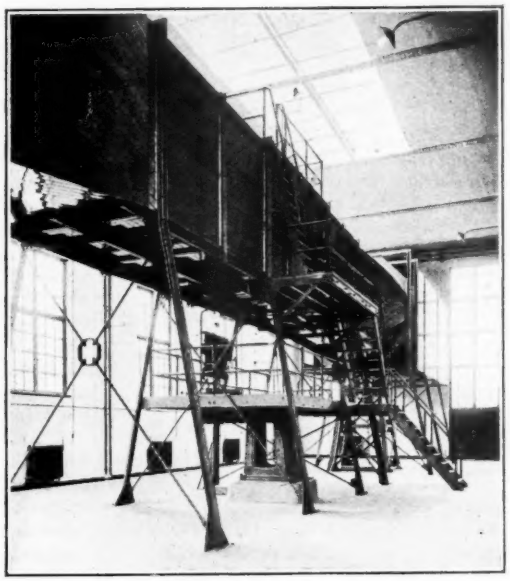
The original 4-ft. tunnel is ultimately to be transferred to this site in order to leave room for the extension of the Engineering Department. The buildings were designed to match the existing buildings on the site. The red facing bricks used were from Dane's Hill brickworks, the panelling being carried out in Crowborough bricks.

A special feature of the building is the "Duplex" channel room, where a clear span of 70 ft. and a height of 40 ft. were equired.

To prevent internal air-eddies the steel girders spanning this apartment project above the roof surface. The filling between the steel trusses is formed with "Siegwart" reinforced concrete beams, laid on the under flange of the girders. This construction has proved most advantageous, no centering being required.

The wind channels themselves required the most scrupulous care both in design and construction, and in the selection of timber, particularly at a period of scarcity in the finer grades of that commodity.

The working section of each wind tunnel has a length of about six times the side of the square cross section. Air is drawn through the tunnel by means of an airscrew, discharged through a distributor into the room containing the wind tunnel, and returned to the inlet end of the tunnel at low velocity through the room. The velocity in the working portion of the tunnel is practically constant over the cross section to within a few inches of the walls. Speeds up to 80 feet per second can be obtained in the No. 2 tunnels, while still higher speeds will be obtained in the additional tunnels.



WIND CHANNEL.

FUEL RESEARCH STATION.

This department was founded for the purpose of conducting research and experiments on a working scale, to establish standard methods of, and apparatus for, conducting chemical and physical tests for fuels obtainable from raw coal, &c., by the process of carbonisation and gasification.

For this purpose an elaborate research station was erected on a site adjacent to the river, with railway sidings, unloading platforms, retort house, briquetting house, tar and oil stills and condensers, laboratories and workshops, and so on, all complete, where it is proposed to probe very completely into at least three main problems :—

1. The use and value of coke for the direct firing of steam boilers.

2. Its gasification in producers for the manufacture of low-grade fuel gas, and the recovery of its nitrogen as ammonia.

3. Its use for industrial and domestic heating, either directly, as it comes from the retorts, or after its conversion into briquettes.

The ramifications of the coal problem are, indeed, without end. The use of town gas as a fuel for industrial purposes, present methods of gas heating, the most efficient way of employing low grades of fuel gas for heat and power purposes, the supply of electricity in bulk, are branches of the subject which it is proposed to investigate here.

The site, as stated, is situate on the river, and difficulties with the sub-foundation were naturally to be anticipated. Four-inch borings were therefore sunk, and at a depth of about 9 feet ballast was encountered, varying in depth from 10 to 20 feet. In consequence of this variation it was found necessary to take borings at practically every point at which heavy concentrated loads were to be anticipated.

The chief problem was encountered in the foundation under the tower. The original tube boring indicated about 20 feet of ballast under that point. When, however, the top ballast was uncovered over an area of about twenty square feet it was found that the ballast varied in depth from 3 to 7 feet, and underneath this ballast was a layer of fine running sand above a further bed of ballast. It was decided therefore to carry the foundations on to the lower ballast if practicable ; upon removal of the top ballast and about 2 feet of the sand it was found impossible to proceed with the removal of the latter owing to the upward pressure. The advisability of piling was weighed, but it was considered doubtful if a pile would penetrate the lower ballast sufficiently to ensure stability, and as an alternative a test was made to ascertain whether bags filled with concrete could be sunk through the sand, by displacement, to a bearing upon the lower ballast. This experiment proving generally successful, the method was adopted and the whole of the foundation was formed of concrete in bags. Diving suits were provided to enable men to work below the water level in order to ensure a firm bearing for the bags on the ballast, and a test was made by splitting up the foundation into fourteen sections, each section being loaded to the ultimate load which the foundation was designed to carry.

On the whole the testing established that the concrete bagging had been carried out satisfactorily, the registered subsidence rarely exceeding half an inch. A raft of reinforced concrete was then constructed upon the concrete bagging, and the superstructure built upon this in the ordinary way, special provision being made for the foundations of stancheons, &c.

Under the main building the concrete raft was kept some two feet below the floor, the surface being finished with a layer of sand upon which blue bricks, roughly grouted in mortar, were laid, and the intervening space was utilised for pipe-runs. By this means any portion of the floor could be taken up without necessitating interference with the concrete raft.

The main building is nearly all steel framed, the curtain walls being formed of 4½-inch brick filling, pointed on both sides, carried by the framing.

The steelwork to this building is very complicated, being so much intermixed with the machinery and plant. This will be realised when it is stated that the floor carrying the coal-breaking plant is only about 20 feet square. The number of detail drawings in connection with this was 132.

At the centre of the main building running north at the higher level are the bunker floors. This floor is spanned by a short span roof wholly glazed. This

also forms the access for coal to the back addition of the main building, in which is housed the vertical retorts. The whole of the main roof is glazed.

Process.—Rail access to the site is about 20 feet above the general level of the site. Coal is brought in trucks to sidings on the existing bank, the coal truck being placed on a turntable situated on the bank, and then pushed into the breaking floor, where the contents are discharged from the truck into the breaking plant. The coal then goes through the breakers and is deposited at the lower level into trucks at 2-feet gauge track. Trucks are then taken to the lift in the tower building and lifted up to the bunker floor level, and empty their contents in the hoppers in the main building or into the hoppers at the north addition, which feed the retorts.

The coal from the hoppers in the main building gravitates to the low-temperature carbonisation plants, from which gas and residues are collected in the gasometers situated outside the building and also the carbonisation liquid tank, etc. The motor residual is tested in the tubing boilers to find its calorific values. The Glover-West retorts situated in the north annexe are for the purpose of high-temperature carbonisation. Water gas plant is placed in the main building for the heating of all units.

Wood-Drying Kilns.

The artificial seasoning of home-grown timber was necessitated owing to the limited cargo space available for the importation of timber and difficulties of obtaining adequate supplies from foreign sources.

The system adopted is that comprised in Erith's patent automatic timber dryer, which embodies the principle of the rotary circulation of a moving mist of very moist, warm air, without employing any mechanism to produce this rotary circulation, which is entirely due to the arrangement of the heating coils and humidifiers.

The timber to be dried is piled up on two wheeled car-bunks, which run on rails laid to a slight slope through the kiln. The timber is suitably piled to allow the warm moist air to penetrate to every board. thus ensuring uniform drying.

The process of drying is a progressive one. The truck loads of timber enter the charging end of the kiln, and are moved through the kiln a certain distance each day according to the number of trucks removed at the discharging end. Thus the kiln is always full of timber, and as many truck loads are put in as are taken out each day. The length of the kilns is such as to allow the timber to be in the kiln for about ten days when two trucks per tunnel are removed per day. This time is allowed when home-grown fir is being treated. The kilns can either be single or double tunnel kilns according to the quantity of timber to be dealt with, and the width of the tunnels varies for the same reason. The widest tunnel used in the kilns we are considering is approximately 33 feet, and the narrowest 20 feet. The former has six lines of rails upon which the trucks of timber progress throughout the tunnel.

Heating coils extend for about two-thirds of the length of the tunnel, and at the discharging end the amount of heating surface is augmented. The first one-third of the tunnel at the charging end is free of heating coils and the timber as it enters is thus introduced into a comparatively cool atmosphere, which, as it progresses towards the discharging end, increases in temperature. By this means the drying of the wood is gradually effected without causing it to warp, twist or crack. The humidifiers for producing the necessary moisture in the kiln are fixed towards the discharging end, and the effect of the cooling of the warm air by the timber as it rises from the heating coils, combined with the disposition of these coils, produces the rotary circulation of the warm moist air.

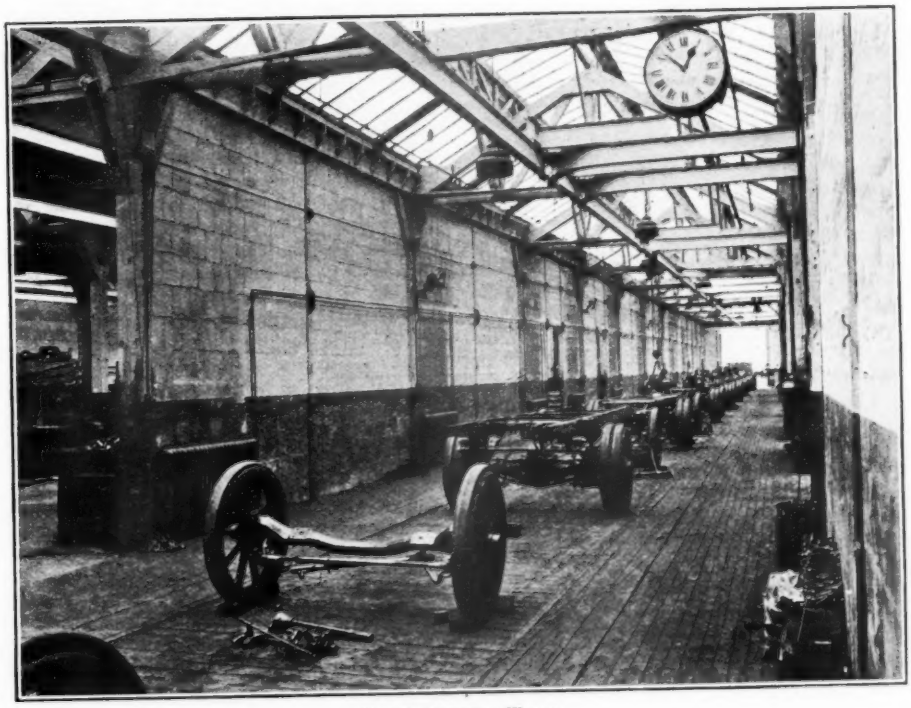
It is of great importance that the air in the kiln should possess the correct degree of humidity. If it is not sufficiently humid the surface of the wood becomes dried, preventing the proper treatment of the inner part. The function of the humidity is generally to keep the pores of the wood open while the temperature draws the moisture out of the wood. It is claimed that this process, while withdrawing the moisture from the wood, does not remove any resinous or other substances, which are valuable in preserving the wood, and its qualities in this respect as well as in others are equal to those possessed by wood seasoned by natural process in the usual way.

In addition to the heating coils and humidifiers within the kiln, controlling valves are assembled in a subway under the discharging platform. Suitable boiler house equipment is provided to supply the steam and to collect and return the condensed water to the boiler house for re-use.

Shafts with regulating dampers are provided at the charging end for adjusting the quantity of air and vapour discharged into the atmosphere, and wet and dry bulb thermometers of the ordinary pattern, and recording hygrometers, are provided for registering the temperature and humidity of the interior of the kiln

Sufficient heating surface in the coils is provided to extract about 1½ tons of moisture per standard of 165 cubic feet from the timber in the process of seasoning, and approximately two tons of steam are required in the heater coils and humidifiers per ton of moisture to be removed. The quantity of moisture in the timber varies considerably, and the above figures may be taken as maximum requirements. The largest of the kilns installed is capable of turning out 80 standards of seasoned Scots fir and larch per week, and the time during which it is in process varies from 12 to 15 days, according to the condition of the timber. The temperature and humidity maintained in the kiln are 120° F. on the dry bulb and 110° F. on the wet bulb, corresponding with about 65 per cent. saturation.

Ten kilns in all were erected, and were sited at



Motor Assembly Works.

national sawmills, sever in England and three in Scotland. Of the ten kilns the one described may be considered a typical example, although not the largest. It is a double kiln built in brickwork. The two parallel kilns or bays in this case are 93 feet long by 25 feet wide, with a clear height of 11 feet above the rail level; below the rails a space approximately five feet in height was occupied by the heating pipes and coils.

The rails are carried on reinforced concrete beams and 18-in. brick piers, and have a fall of 1 in 60 towards the unloading platform.

The kiln is roofed with timber, Belfast trusses span both bays, thus making provision for the removal of central wall at the end of the war for conversion into a shop, mill or store shed.

The roof covering is of corrugated iron, and the underside is ceiled in cement plaster, or in some cases with fibro-cement sheets. The roof is continued at each end to provide a covering for the loading and unloading platforms. The ends are closed by heavy canvas curtains working on rollers, this being a most simple and effective method of containing the heat and humidity.

Steam is generated by two loco boilers erected in a small separate boiler-house, the sawdust being used as fuel.

The capacity of the kiln while fully loaded is 56½ standards, and the number of standards seasoned per week is 37½, while the moisture evaporated per week equals 56½ tons.

These kilns have proved most satisfactory, and the output has exceeded the estimate by about 30 per cent., while the quality of the seasoning has been excellent.

Motor Assembly Works.

Unit Stores.—These buildings are of the type known as semi-permanent. They were erected for the purpose of facilitating the rapid construction of a large number of motor lorries required for transport on the Russian frontier. The proposals for the output of this building were put forward by the Russian Government to the English Government in about November, 1916; and the Ministry of Munitions delegated the work to the Associated Equipment Co., Walthamstow. This company deals with practically the whole of the transport in the London area, and its associated companies control the London General Omnibus Co. and the United Electric Underground Railways, etc.

The Ministry of Munitions required this building with particular urgency, anticipating at that time that Russia would undertake a very vigorous offensive in the spring and summer of 1917.

The first particulars were received on November 10th, 1916, and the drawing staff concentrated upon the production of the necessary drawings, which were finished on the 14th, together with a complete specification, and were approved by the company and by the Ministry at once, a contract being arranged so that work could be commenced upon November 23rd.

Owing to the necessity for rapid erection, the building was so designed that the minimum amount of material would be requisite to give the covered area. Timber was selected for the main portion of the structure, as long span roofs were not required.

The timber posts were spaced at distances of 20 feet, at right-angles to the trusses, the trusses themselves being 20 feet span. The posts were built out of 3-inch timbers bolted together. They supported a timber-framed gutter, the deflection of the gutter being reduced by brackets springing from the sides of the posts. The roof trusses were constructed of timber, the joints being effected by means of steel plates. The purlins were also of timber, and in order to reduce the depth over the long spans, supporting brackets were built up from the tie-beam.

The north slope of the roof was glazed, the south slope being covered with corrugated asbestos sheeting. The gutters were formed of bituminous felt in two layers. It may be remarked that this was an experiment with corrugated asbestos sheets, which were adopted in order to save the expense of slate roofing, a strong objection being raised to corrugated iron owing to the expense of maintenance. The corrugated asbestos sheets were found to be unseasoned in some cases, and under the guarantee of the firm supplying them they had to be replaced from time to time. The seasoned sheets were found to be satisfactory. The roof glazing was of a reinforced concrete bar—lead covered bars were difficult to obtain, and the wood substitute bars had not been fully developed. The reinforced bar answered satisfactorily after being placed in position, but it was found that during transit a very large number of them became strained and broken.

The external walls of the building were constructed of hollow terra-cotta blocks filled-in between the timber framing and brick piers. The floor throughout was of concrete finish with a spade face—granolithic was not required.

The main feature of this building was the method adopted for building up the motor lorries. The idea of a moving band was first developed by Mr. Ford in America for the purpose of constructing his motor cars, and the management adopted the same principle with slight variations. It is 8 feet broad, and consists of a platform formed of timber bars 4 inches wide and 3 inches thick. These bars are fixed to a chain or a band on the underside, and the band revolves round two drums at either end of the building. The band is 276 feet long in all. The method of working provides for the band to travel at a certain number of feet per second, and the motor lorries are built up upon it as it moves forward. For instance, the back wheels and front wheels are taken out of compartments at the side of the band and are placed in the exact positions required. As the band moves forward it comes opposite another

compartment in which the frames are stored. The frame is placed upon the wheels, and the band again moves forward opposite another store, in which engines are supplied. This method is continued down the whole length of the building, the heavy engine parts being taken from the stores to the requisite position on the band by means of overhead pulley-blocks. The rate of travel is such that it enables the workmen to fix all the component parts in order; and by the time the motor lorry reaches the end of the band it is ready to drive away with its own engine filled with petrol.

The system worked very satisfactorily, the difficulty being to ensure the supply of the necessary number of component parts in order to keep it perpetually at work. Apart from this difficulty the rapidity of erection exceeded all expectations.

The moving band was in operation within about 2½ months from the date of the commencement of the work.

DISCUSSION.

Mr. H. D. Searles-Wood, in the Chair.

Mr. PERCIVAL FRASER: It is my privilege to-night to move a vote of thanks to Sir Frank Baines for his wonderful paper on war buildings.

I think we in this Institute ought to be proud of Sir Frank Baines. It has been our cry for the past five years that the architectural profession has never been properly utilised, but I think Sir Frank Baines, at least, is one architect who has done yeoman service in a time of great crisis. At the same time, I think he has been in an enviable position, for he has had the resources of the greatest Empire in the world to call upon. These buildings seem to have been undertaken wholesale. Foundations were tackled with considerable courage, but, at the same time, at enormous cost. It has been my misfortune—or my fortune—to specialise in this type of building—factory buildings—but I have received nothing but rebuffs from the Government, although since 1914 I have not had one penn'orth of work which was not of the greatest national importance in the way of buildings for foodstuffs, aeroplane factories, and so forth. Had it not been for Mr. Hare and Mr. Newton at the Ministry of Munitions, I do not know what architects like myself would have done. Sir Frank Baines spoke, I thought, slightingly of architecture as ordinarily understood. ("No.") He said there was only one way to understand the word, and that is the dictionary definition. According to the Oxford dictionary, it is: "Architecture is the art and science of designing and building, especially structures for the purposes of civil life." There is nothing in that to speak of in a disparaging way. I am sure the Government were not averse to architecture of that sort. Architecture in no sense means decoration, but the erection of buildings usefully and economically. There is one thing which Sir Frank only touched on lightly, and that is the lack of forethought in not providing more fireproof buildings. We have had one or two frightful disasters in this country. One we all know of was in the neighbourhood of Nottingham, and that was entirely due to the lack of a fire installation and fire-fighting appliances, particularly sprinklers. Both that calamity and the one at Silvertown started in fires of moderately small dimensions which would have been automatically extinguished if there had been those appliances.

I would like, if I might, to indulge in one little grumble about the paper, and that is, I wish there had been a little less chemical engineering and a little more construction detail, particularly in regard to the factory where Sir Frank used the ingenious method of finding the foundation ballast with sacks. It would be helpful if we were given one or two working drawings, showing the method of eliminating internal columns so as to get a clear space of over 100 feet. It would also be well to know what experience he gained in the use of north lights, the use of which is not well enough understood in this country.

Again, I would like some information about the huge sliding doors in one of the factories, which must have weighed many tons, and which, I presume, must have been opened and shut by mechanical means.

In thanking Sir Frank Baines for this wonderful paper I am sure the Institute will be behind me when I try to pay some small tribute to the heroism of the workers in these factories, for they have been paid for not in money only, but in blood. (Applause.)

Mr. W. J. H. LEVERTON, *Licentiate*, in seconding the vote of thanks, said:

I was very pleased to hear Sir Frank Baines' remarks about architects and engineers working together; that is the only way to get the work thoroughly well done. But one of these must lead, you cannot have dual control. In the war it was only when the supreme command was in the hands of one man that we won, and so in civil life, one must be in supreme control. I think that, at all events, here—whatever Great George Street may think—we in Conduit Street believe that that one man should be the architect. He is able by his training to take a more statesmanlike view on the matter than is the engineer. The engineer enters more into details, the architect is he who plans the general scheme, and he must call in the engineer to work out the details.

I was also pleased to hear Sir Frank's remarks upon architecture, that it is not merely a question of piling on ornament. To one building he showed I thought he gave a fine architectural character; it was illustrated in the *Builder*, and the proportions were extremely nice.

THE CHAIRMAN: In putting this vote of thanks, there are one or two questions which I myself would like to ask. We have heard much about Belfast trusses, and I would like to hear Sir Frank Baines' opinion about that form of construction; what is the cost of maintenance of those roofs which are supported

by the Belfast trusses; and how shafting which is fixed on Belfast trusses behaves itself.

I would like to confirm Mr. Percival Fraser's remarks as to the way in which Sir Frank has brought this subject before us. He has certainly built the largest sheds that England possesses, and seems to have given us the longest paper we have had in the Institute. At the same time, every word Sir Frank Baines said seems to have been so full of interest that I have not lost a single sentence, and to maintain interest in that way is a very great thing in a lecturer.

SIR FRANK BAINES (in reply):

One of Mr. Fraser's remarks made reference to the fact that I was in the very happy position of commanding the resources of this great Empire, and that, therefore, I need not consider money. But I would inform him that money was one of our bugbears: it was impossible for me to get a scheme through unless I could assure the particular authority responsible for it that it was as economical and cheap as it could be under all the conditions. It was never thought, when we had to do this exceptionally difficult work in exceptionally short periods of time, that that necessarily meant extreme expense; it was not recognised, but we had to attempt that under conditions as to cost which I am sure we should not attempt to do to-day. We had to revise our standards and take risks, to revise our methods, and cut down materials to the lowest limits, so that in the great steel constructions of this war I have reduced the ordinary factor of safety from 4 to 3, a course which is incurring a grave responsibility, especially as that factor had to be undertaken when we were utilising structures of great complexity, and with steel which behaved differently under various conditions. Therefore, one of the most material causes of pride which I rather take to myself in this matter is that we have never taken the stand that money was no object in our work, but our attitude has been that efficiency was absolutely the handmaiden of economy, and that unless we worked up to such standards we were not worth our salt.

With regard to foundations, Mr. Fraser said we had the power to undertake this difficult work without relation to cost, but in the problem I referred to this evening there were only two methods open to us: either by piling, or by the unusual method which I undertook. I got an estimate for this work by piling, and I accomplished it for £4,300 less than piling would have cost. But what I did was not so much to effect that economy of £4,000, but to gain in speed of construction. If I had to start piling on that tower, I should lose seriously in the matter of time, and therefore the work was undertaken under rather unusual conditions and on an unusual system, not only to save money, but also time.

Then a question was raised as to how we got these sacks of cement down to the sand, and how we found the level of the ballast below this mass of sand. The sand was so bad that I found the level of the ballast by a rod 22 feet long and 1½ inches by 1 inch, which rose by bottom pressure to its full level. That is not exactly an explanation of how I knew I was going to get there. I knew I could get there rapidly by dropping into the sand, and it was unnecessary to undertake excavations when a rod behaves like that.

A question was also raised as to whether I did not refer in some way slightingly to architecture. I think such an impression must be due to my inability to express myself clearly. Certainly I am free from having any desire to make a slighting reference to architecture, so much so that I have gone, cap in hand, to the various Government departments during this war, begging them to allow us to act as architects, and not as pseudo-engineers; to act as definite architects who, by the ordinary training of an architect, are empowered to carry out the most difficult process work and adjust buildings to the demands of the industry and the special services of the war. But I did find this—and perhaps it was that which made Mr. Fraser misunderstand me—that whenever we have given the impression on our drawings that we were architects first and pseudo-engineers second—and we were always aiming to give that impression—we always found this work treated with the gravest suspicion. That, I think, is due to the fact that architecture has certainly not yet come into its own. But what has been most illuminating to me, as an architect—and I should try to function as an architect before functioning as an engineer—is that I feel the training of an architect, his adaptation to a problem, his power of organisation in a problem, his power of design, not only as regards the façade of a building, but to meet the requirements presented by a difficult problem, enables him better to carry out this work than an engineer.

With regard to our supplying drawings to members in order to show how we obtained the clear space and spans of over 100 feet, that would be a simple matter, and I should feel honoured if any member of the audience were to apply to me for drawings which would show our great spans up to 150 feet. The system we followed was that of an architect, not the system of some engineers, though I must not be interpreted in saying that as casting any aspersion on the engineer. Whenever we had an exceptional plan or exceptional difficulties we did not meet that difficulty by sending down sketch-designs to contractors and asking them to submit schemes. We ourselves got out our schemes in full detail and sent them out. We said then to the great contractors: "We may be wrong, we may be uneconomical: tender for our scheme, and suggest your own as well." In no case did we follow the contractor's scheme, not because we considered that our scheme was above reproach, but we looked very carefully into every scheme which was submitted to us, and we found our own were the most carefully thought out, because we had looked at the matter from the point of view of the architect who wanted to be responsible for the work in all its details;

and that is not necessarily the case with every engineer, though it is the case with all good engineers.

With regard to the rebuff which architects got from the Government during the war: I want to say that that is the fault of the architects themselves. If I had been President of this great Institute when the war broke out, there should have been no reason to complain that the Government administered rebuffs of this character. It was the function of the President to say to the Government: "We as architects hold that we are capable of doing these factories; we will carry out your Government programme."* Nobody did it, and it came to us to carry out a small portion because the Institute was not prepared to undertake this programme.

A question has also been raised in regard to north lights. As an architect, I do not like them, they do not give a good façade, they bring in complications which I do not like; but I had to accept that condition because so many of the processes for which the north-lighted buildings were erected were of such grave danger that we had to guarantee that no direct sunlight could reach the floors. One of the problems of north lighting I discovered during the war was that when you get sheds of 480 feet in length with continuous north lighting, with the tremendous length of gutters I found that the temperature stresses on the steel gave us some difficulty, and steps had to be undertaken to counteract that difficulty. Apart from that, however, I have not found any difficulty in north lighting, even in sheds with the large span of 150 feet.

With regard to the large sliding doors, I shall be pleased to supply the information. They were 35 feet high, and 20 feet wide, and 5½ tons in weight. It is essential that those doors shall be capable of being readily moved by hand by one workman. It was injudicious to provide winches to pull the doors in and out, because the whole of the doors had to be entirely cleared to allow flying-boats to move out. Therefore I introduced there what has rarely been done in doors of this kind before, and that is a patent Skefko ball-bearing, so that the windage on the door was immediately taken up by the curved bushes of the Skefko bearing, and in that way the 5-ton door could be readily moved by one person. The danger was that the man had to apply his whole strength to move the door. That was not easy to do, but once it got moving the trouble was to make it go slow. Our object was to prevent it breaking away. Therefore the strictest instructions were given that the doors must be moved very steadily, because, however big the stops which were put on the runner girders, two men rushing the door merrily along would bring it away from the containing girder and stops. But full details of this I shall be happy to supply.

With regard to the kind references which Mr. Leverton made, it was hard grinding from "early morn to dewy eve"; during 1916 my staff got there at 9.30, and left the office at 2 and 3 in the morning, and that went on night after night, Saturdays and Sundays too. The work could not have been carried out without a truly magnificent staff, every member of which sank all his private feeling in order to carry forward the programme. Programmes were thrust upon us time after time as difficult works appeared, so much so, that we got in many cases the pick of the workmen. In many cases the Department undertook work which they thought was easier, and they presented to us the work which was difficult, work the time for which was too short, and the problems in connection with which were considered rather dangerous and difficult to deal with.

You, Sir, raised a question about the Belfast trusses, and I am very interested in that subject. At the beginning of the war I built many miles of Belfast trusses for storage, and I found very little difficulty occur in connection with them, assuming, as I arranged, that the trusses be carefully disposed in erection. The assembling of the Belfast trusses is the most important factor in their efficiency. Of course, the design is the most important point; but, assuming the design is right, the most important point is to see that the truss is properly assembled, not loosely assembled, otherwise there is excessive deflection, a pulling away of slats, and all sorts of trouble. Excessive deflection makes it impossible to deal with the hanging of shafting of a subsidiary character on the trusses. In one case, at a large fuse-filling factory, I erected many Belfast trusses, and after the shops had been erected I was informed that subsidiary shafting, in three lines, had to be hung to them, and it had not been designed for carrying that. I told the company it was injudicious to attempt to hang shafting to the trusses. They told me the requirement of the Treasury was altered and that it was necessary that the trusses should have the shafting to them. I then boarded the trusses with close boarding, and I found afterwards that that had been thoroughly satisfactory. It had carried three lines of subsidiary shafting without unusual deflection. But later on in the war when the material used in the construction of the trusses was changed in character, I found it necessary to drop the use of Belfast trussing, particularly for large spans of 98 feet and over. At this period, however careful you were in design and in the supervision of the construction, you could not guarantee that you would not have exceptional deflection, owing largely to the soft fibre of the wood. For that reason later in the war we went in for other methods of construction.

* Reference to the R.I.B.A. JOURNAL for 1914 will show that at the outbreak of the war the Royal Institute did do exactly what Sir Frank Baines says it ought to have done.—ED.

ARTHUR RUTHERFORD JEMMETT [*F.*].

We have to announce with the greatest regret the death of Mr. Jemmett, who passed away on 17th September, after a long and painful illness, at the age of 56. Mr. Jemmett was articled to J. J. Stevenson in 1879, but the contract was terminated by mutual consent in 1882. He entered the R.A. Schools about 1885, gained the R.A. Travelling Studentship (England) of £60 for Design in Architecture in 1888, and in 1891 was bracketed with another for the R.I.B.A. Soane Medallion and received a grant of £25 for travel on the Continent. He worked for some time in the office of Mr. T. E. Collcutt. He attended the International Congress of Architects held in Vienna in 1908, and twice visited America, seeing some of the principal cities of Canada and the Northern States. In partnership with Mr. A. Tayler, he designed and carried out the municipal buildings, baths, and fire station at Tottenham, erected in 1904–5. His design for the L.C.C. Hall was submitted in partnership with Mr. McCombie. The following appreciation by Mr. H. V. Lanchester appeared in *The Builder* of 26th September :—

" The architectural profession has suffered a greater loss in the death of Mr. A. R. Jemmett than many of its members would be aware of. His achievement in actual building work was not outstanding, and while he obtained some successes in competitive designs, several of marked distinction had not the good fortune to secure awards. It was not on his works that Mr. Jemmett's claims to the gratitude of his *confrères* can be based, but on his untiring and altruistic zeal for the advancement of contemporary architecture and the methods for securing this advancement. Ever since his student days the theory of architectural education had received his unremitting attention, and he had always urged that our somewhat haphazard and empirical system demanded strengthening by the adoption of the more reasoned and logical one of France. That this view has now secured such support as bids fair to bring it into general adoption is due in no small measure to Mr. Jemmett's pioneer work. That this did not make itself more quickly felt was owing to his personal qualities. One of the most retiring and unassuming of men, he was disinclined to voice his opinions except to those from whom he anticipated a sympathetic hearing ; at the same time, a certain Puritan rigidity with regard to the artistic faith that he held occasionally repelled those who might by circuitous methods have been brought into line. Only those who were admitted into his friendship could quite realise that under the somewhat abstract forms with which he was wont to clothe his arguments burned a bright flame of enthusiasm for the future of his art.

" Mr. Jemmett took the broadest views as to the scope of architecture, and regarded the town-planning movement as a branch of architecture and not, as some have considered it, an independent science merely calling in the architect to devise embellishments and decorations. His studies in this direction led to his being asked to conduct the monthly section in *The Builder* devoted to this subject, for which he was mainly responsible during the years 1910–11–12. Shortly after this Mr. Jemmett, with two or three personal friends who shared his views, approached the Society of Architects and enlisted the sympathies of that body for an educational scheme on the lines of the Paris ateliers linked up with the Ecole des Beaux-Arts. Under the advice and with the support of several prominent French architects, the first atelier in London was opened, Mr. Davis, as an old Beaux-Arts student, consenting to become the patron, and M. Chaurès, who had also had a distinguished career in the Paris schools, the sous-patron. The atelier soon became a centre of very vital artistic activity, and Mr. Jemmett devoted a large share of his time to its service, frequently suggesting the programme and acting as one of the assessors, at other times working out a project as a student or conducting the very popular life class.

" With the departure of M. Chaurès and Mr. Davis on war service, Mr. Jemmett kept the atelier in being throughout the period of the war, and though the students were few at times, there was always interesting work going on, except for a brief period when pressing demands from the Air Ministry led to everyone available undertaking the work of tracing details of aeroplane construction.

" Despite the fact that he was at that time responsible for the atelier, when the Civic Survey of Greater London was inaugurated in 1915, Mr. Jemmett, as a member of the Professional Employment (War) Committee, was urged by those who knew his special suitability for the position to become honorary director of this undertaking. He accepted, well knowing that this would leave him but little time for his own practice, and acquitted himself in this service with such distinction that, had he been spared a little longer, an opportunity would have been sought to show that his devotion to the work of the survey had not been unappreciated.

" It is possible that the demands on Mr. Jemmett over-taxed his strength, for he was never one to spare either time or energy when he felt that a responsibility rested on him, and his position in the Survey involved many rather difficult questions of principle, to which he gave anxious thought before arriving at his decisions, but which would involve us in too long a digression were we to discuss them here. In brief, all those whose work he directed found in him a considerate friend, and many will feel the loss of one who was near to their thoughts and hearts. Whether an undertaking was going to profit him personally or not was ever the last consideration in his mind, and we could name but few whose activities were so free from any idea of personal aggrandisement."

HORATIO WALTER LONSDALE.

Died 8th September, 1919, *aged* 75.

In Mr. Lonsdale art has lost a man of marked ability and wide attainments. He was articled to an architect, but turned aside to practise the "arts accessory to Architecture." Though his pursuits were many, probably the larger proportion of his time was devoted to stained glass. In conjunction with the late E. J. Tarver, he published a book on mediæval costume under the auspices of William Burges. He assisted the late Marquis of Bute in his heraldic studies of the armorial bearings of the Royal Burghs of Scotland. He designed the distinguished badge and chain worn by the Mayors of Holborn. He examined the students of South Kensington in mathematical problems, which Alexander Pope's indulgent critic would, in the case of most of us, "propose as things forgot." Pressed one day to take up the study of Esperanto as being so useful in travelling, he was at length driven to stop the enthusiast by telling him that he could already speak the language of every country that there was the least chance of his desiring to visit. He was a hard worker, a kind friend, a delightful companion, and, above all, modest, even to a fault.

LACY W. RIDGE.

An Appeal from the Ministry of Labour.

*Montagu House, Whitehall, S.W.*1.

On behalf of the ex-service men who laid aside their careers at the call of duty, I make a strong appeal to you to aid them to fit themselves fully for the highest posts in the great professions.

The Government have decided to supplement private effort by means of Maintenance Grants under the Training Grant Scheme, which has been described in the Press and elsewhere. Training for professional qualification is usually best undertaken by service in an office or works, and it is in many cases the custom to charge a premium for pupils who take up such service. More openings for training are urgently wanted, and many ex-service men cannot now afford to pay premiums.

These men have proved themselves ready to give up everything. Their sacrifice cannot be measured in money. But it can be repaid in part. I urge you to think of your debt to them as their premium, and to waive for them the usage of the profession, as many public-spirited firms have already done.

For over four years the normal supply of fully trained men has been stopped or diminished. More must be obtained in the next few years than ever before, if the profession is to recover its strength and face the economic struggle that is before the whole nation. I ask you, therefore, to make room for pupils to the utmost of your capacity and to aid the Appointments Department in the work of resettlement, by telling them of what you can do to help.

R. S. HORNE,
Minister of Labour.

NOTE.—Communications should be sent to the local office of the Appointments Department, the address of which can be obtained at any Post Office, or from the Appointments Department, St. Ermin's Hotel, Caxton Street, Westminster, S.W.1.

9 CONDUIT STREET, LONDON, W., 30*th September* 1919.

CHRONICLE.

The R.I.B.A. Record of Honour: Sixty-fifth List.

Fallen in the War.

SMITH, L.-Cpl. JAMES BUCHANAN PENTLAND [*Licentiate*]. Died in East Africa on active service, 1st May 1917.

Military Honours.

COLLINS, Lieut. GEORGE, R.E. [*Licentiate*]. Mentioned in Orders.

CRANFIELD, Lt.-Col. S. W. [*F.*]. Mentioned in Dispatches.

CROWE, Capt. J. J., R.E. [*A.*]. O.B.E. (Military).

GREENE, Capt. W. HOWE, R. Newfoundland Regt. [*F.*] O.B.E. (Military).

LOFTHOUSE, T. A. [*A.*]. Meritorious Service Medal.

PENFOLD, Sergt. J. T., R.E. [*A.*]. Mentioned in Dispatches, Salonica.

PITE, Lieut. ROBERT W., R.E. [*A.*]. Mentioned in Dispatches, Mesopotamia.

The brilliant record in the war of Brig.-General A. B. Hubback [*A.*] has been already mentioned in the JOURNAL. The following is a complete list of his promotions and distinctions: 1902-14, Malay States Volunteer Rifles, Captain 1902, Major 1910, Lt.-Col. 1912; September 1914, Major, London Regt., T.F.; February 1915, Lt.-Col. 20th London Regt., T.F.; March 1916, Brig.-General; June 1916, C.M.G.; January 1919, D.S.O.; February 1919, Colonel T.F., retaining rank of Brig.-General; March 1919, Hon. Brig.-General in the Army. He was mentioned in Dispatches six times and was once wounded. Brig.-General Hubback has now retired from practice and is settling in England.

Peace Day: Messages of Congratulation.

The following messages have been received in reply to the Council's Greetings to the Allied Societies on the occasion of the Peace Celebrations:—

From Canada:

Toronto.

"Appreciate greetings. Britain's honour gloriously upheld. Congratulations reciprocated."

A. FRANK WYCKSON, *President*,
Royal Archl. Inst., Canada.

From Australia :

Melbourne : July 25th 1919.

To the President, R.I.B.A.—

DEAR SIR,—Your cablegram just received asking me to convey the warmest greetings and congratulations of the R.I.B.A. to the architects of Australia upon the victorious Peace just concluded. I shall have the greatest pleasure in so doing, and will at once convey these greetings and congratulations to the various Australian Institutes of Architects. With warmest greetings and best wishes from myself to you and the members of the R.I.B.A., believe me, yours sincerely, GEORGE C. INSKIP [*F.*].

Building Industries Consultative Board.

The following note, headed "Team Work in the Building Trade," giving particulars of the Board's activities, has been circulated to the Press:

A determined and hopeful effort is being made to get rid of the difficulties which are hampering the efficiency of the building trade. Never before has it been so vitally necessary to the welfare of the country that the trade should be vigorous, productive, economical, and smoothly running. Not only are those vast arrears of ordinary building work to be made up, but the gigantic National Housing Scheme demands the utmost possible output of work. Yet at the moment the trade is stagnant, producing little and at an excessive cost, and hampered by doubts, difficulties, friction, and the threat of internal war.

Early in the summer the Royal Institute of British Architects summoned a conference to consider what could be done to restore health to the trade. Dr. Addison, then President of the Local Government Board, and now Minister of Health, came and gave his official blessing to the movement. It was warmly taken up by all the representative bodies concerned, and at the end of May a Building Industries Consultative Board was founded. It contains, in equal numbers, representatives of the professions and trades concerned. Five architects, five surveyors, five master builders and five operatives, with the President of the Royal Institute as Chairman, and Mr. J. P. Lloyd, of the National Federation of Building Trades Operatives, as Vice-Chairman, constitute the Board. It has been meeting regularly at Conduit Street, and it is not too early to say that its work has already justified its existence.

It faced the main problem at once: What is the reason for the stagnation of the trade? Clearly the answer lies in the vastly increased cost of building. Why does building cost so much more than in 1914? Because labour and building materials cost more. Here the Board was faced by an enquiry along two lines. It began with materials. The master builders at once supplied ample evidence of the facts from their own recent experience. Materials had gone up to fantastic prices and the supply was slow and uncertain. Had Government action anything to do with it? The Ministry of Munitions has a Department of Building Materials Supply which has been conducting vast operations. So the Board sent a deputation to the Ministry of Munitions to find out the facts. The Ministry met the Board in a most businesslike way and put its cards on the table. It had had to face the fact that at the date of the Armistice the production of bricks and other materials had almost ceased. The yards were either closed down or in a desperate condition. To get the industries going and bring output back to normal conditions it had helped them with money and with vast orders. The policy had succeeded and the supply of material was now in a fairly safe position. But for the action of the Ministry it is clear that the shortage of bricks and other essentials would have made it impossible to embark on the housing scheme on a large scale. But if the supply is now fairly adequate, what justification is there for the fantastic prices which are being demanded? The Board, with all the facts before it, came to the conclusion that the time had come for the Government to suspend their operations and leave the laws of supply and demand to settle the price of materials. A resolution to this effect has been sent to the Government, with a further recommendation that the building trade should be left free from any form of Government control or interference. If the Government will act on the advice of the Board it is hoped that in a comparatively short time prices will come back to a reasonable level.

Next came the problem of labour—the other great factor in the high cost of building. Admittedly the supply is short. Many men have fallen in the war, many are still in the Army, the usual flow of recruits to the trade has been largely suspended since 1914, the older men are tired, the demobilised men have not quite got back the power and habit of steady work, many of the operatives have been demoralised by the pernicious system on which so much Government work was done during the war—cost plus percentage as it is called. Wages have gone up largely since 1914. Whether they have kept pace with the rise in the cost of living is a debatable point. The unions say no, the masters say yes. But whatever the truth is, the rise in wages would not matter if output were satisfactory. The masters say that output has gone down deplorably since the beginning of the war. Too many men are not doing anything like a fair day's work for their wages. Whether or not it is officially sanctioned by the unions, there is in fact a deliberate policy of restriction of output by the men. That is the masters' case.

To some extent it is conceded by the operatives. They claim that "real" wages have fallen since 1914, but they admit that the methods of the Government during the war have had a demoralising effect upon many of the operatives and have lowered the level of craftsmanship. They deny that individual output is restricted to the extent that is suggested, but they admit that it might be greatly improved by the introduction of a new spirit and a new tradition into the building trade. They claim that in the past the policy of the unions as regards wages and output was justified by the bad old tradition of rate-cutting among the employers and by the well-founded fear of unemployment which arose from the casual nature of the trade. They say that the men will never be permanently satisfied until a real change is made in the methods of the trade. They are not content, as in the past, to be simply "hands." They want a real share in the control and guidance of the industry in which they have invested their lives and their skill. It is not a question of money but of status and functions. Most employers meet this claim with an absolute *non possumus*. Those who have the financial responsibility must have control of the business. They cannot share it with those who have none. But there are signs that, after all, something can be done to meet the views of the men without ruining the industry. The Whitley Council of the Building Trade is thinking out a scheme on the most idealistic lines. Many minds are at work and the common sense and common interests of leaders on both sides will surely arrive at a solution without the interposition of industrial war, which must do infinite harm to the country and cannot possibly settle the question.

In the meantime the Consultative Board is at work on the organisation of a crusade for the introduction of a new spirit into the trade. It hopes to awaken in the minds of everyone engaged in the industry that "team spirit" that carried the nation through the war to a triumphant issue. It believes that the situation will be saved, not by higher wages and shorter hours, but by a new attitude of mind on the part of all concerned.

National Housing: The R I.B.A. Scale of Fees.

As a result of long negotiations with the Ministry of Health, the Board of Agriculture and Fisheries, and the Scottish Board of Health, a scale of fees for

Architects and Surveyors engaged on housing schemes has been agreed between the Royal Institute and the Government Departments concerned.

The Royal Institute scale recently published has been substantially adopted. The fees for lay-out work have been increased, as it appeared that the work required by the Ministry was greater than was contemplated by the Council at the time when the scale was drawn up. The fees for road and sewer work have been somewhat reduced. The fees for houses and flats have been adopted, together with a limitation of the number of houses entrusted to any one architect in any one scheme, which involves an increase in the fees payable to architects as a body. The general conditions governing the employment of architects in housing schemes have been taken almost word for word from the Royal Institute scale. The fees for quantity surveyors were agreed by the Surveyors' Institution and adopted by the Royal Institute.

It will be seen that the official adoption of the Royal Institute scale and its circulation to all local authorities by the Government Departments concerned will materially benefit members and will do a great deal to place the national housing scheme on a proper basis.

The revised scale published by the Royal Institute and the memorandum issued by the Ministry of Health are printed below for the information of members [*see I. and II.*].

It will be necessary to summon a Special General Meeting at an early date to obtain the sanction of the General Body for the action taken by the Council on behalf of members and to authorise the insertion of the revised scale in place of the existing Clause 9 in the General Scale of Charges.

I.

ARCHITECTS' FEES FOR HOUSING SCHEMES.

SANCTIONED BY THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

(*Approved by the Ministry of Health, the Board of Agriculture and Fisheries, and the Scottish Board of Health.*)

Special arrangements may be required in exceptional circumstances, but for ordinary cases the following scales of fees and arrangements shall apply:

1.—ARCHITECTS.

A.—PREPARATION OF LAY-OUT PLANS.

For the preparation of a plan or scheme from existing maps, showing roads, builders' plots, and buildings in block, including:

(1) Conferences with local authorities and their officials;
(2) Surveying, levelling, and preparation of contour plan;
(3) Lay-out plan (where necessary) to 1/2,500 scale;
(4) Detailed lay-out plan or plans to 1/500 scale;

but exclusive of the preparation of detailed plans of buildings:

For the first 25 houses	£1 per house
For the next 75 houses	10s. per house
For the remainder	7s. 6d. per house

In cases where the number of houses has not been determined, the fee shall be based on an average of ten houses per acre.

Where a fully contoured plan of the site is provided by the local authority, a deduction shall be made in respect thereof, from the fees above stated, of £1 per acre.

B.—ROADS AND SEWERS.

For preparing working drawings, specifications and quantities for roads and sewers in accordance with the lay-out plans prepared under Section A, advising on the same and on the preparation of contract, furnishing to the contractor one copy of the drawings, specifications, and quantities, general supervision, issuing certificates, measuring up, passing and certifying the accounts:

For the first 25 houses	£2 per house.
For the next 75 houses	£1 per house.
For the remainder	15s. per house.

C.—COTTAGES AND FLATS.

For taking instructions, preparing sketch design, making approximate estimate of cost, preparing drawings and specifications, obtaining tenders, advising on tenders and on preparation of contract, selecting and instructing consultants, furnishing to the contractor one copy of the drawings and specifications, and such other details as are necessary for the proper carrying out of the works, general supervision, issuing certificates for payment, and passing and certifying accounts:

5 per cent. upon the first 12 cottages or flats.
2½ per cent. upon the next 60 cottages or flats.
1½ per cent. upon the remainder.

This scale covers the ordinary variations in type of house and such modifications as are made to avoid monotony in appearance.

Save in exceptional circumstances, it is not desirable that any one architect or firm of architects should be entrusted with more than 250 houses in any one scheme, but the fees payable in respect of each 250 houses shall be calculated as above, whether or no several architects be employed thereon.

2.—QUANTITY SURVEYORS.

For the preparation of bills of quantities:

2 per cent. upon the first 12 cottages or flats.
1 per cent. upon the next 60 cottages or flats.
⅝ per cent. upon the next 178 cottages or flats.
½ per cent. upon the remainder.

This scale covers the ordinary variations in type of house, and such modifications as are made to avoid monotony of design.

For measuring variations on the contract and adjusting the final accounts, the remuneration shall be at the rate of 1½ per cent. on additions, and 1 per cent. on omissions brought into account.

The above scale is exclusive of all disbursements in respect of printing, lithography, and other out-of-pocket expenses.

The above scales of fees are intended to include all necessary duties of an architect and surveyor incidental to the carrying out of the work, including such duties as are involved in complying with the requirements of the Ministry of Health.

Architects' fees for housing are included in, and subject to the conditions of, the "Scale of Professional Charges" issued by the R.I.B.A.

II.

GENERAL HOUSING MEMORANDUM No. 4.

Ministry of Health, Whitehall, September, 1919.

FEES PAYABLE TO ARCHITECTS AND QUANTITY SURVEYORS IN CONNECTION WITH STATE-AIDED HOUSING SCHEMES.

The Ministry of Health has decided that the fees payable to architects and quantity surveyors in private practice

for professional work which may be charged in the accounts of State-aided housing schemes and rank for financial assistance shall be according to the scales set out below. These scales have been framed on the assumption that properly qualified members of the respective professions will be employed.

No charge to capital account will be allowed in respect of the preparation of schemes which are not approved by the Ministry of Health.

Special arrangements may be required in exceptional circumstances, but for ordinary cases the following scales of fees and arrangements shall apply:

[*Here follows the Scale for Architects' and Quantity Surveyors' Fees as set out in the R.I.B.A. Paper above printed.*]

The above scales of fees are intended to include all necessary duties of an architect and surveyor incidental to the carrying out of the work including such duties as are involved in complying with the requirements of the Ministry of Health.

The conditions of engagements of architects and surveyors shall be those which are customary in the respective professions; for example, generally, such as the conditions prescribed by the Royal Institute of British Architects in the case of the engagement of architects.

Appointments by the President.

Since the last issue of the JOURNAL the following appointments have been made by the President:—

Arbitrator: Mr. E. Guy Dawber, *Vice-President.*

Assessor: Mr. Ernest Newton, R.A. [*F.*], West Hartlepool War Memorial Competition.

The President has made the following appointments at the request of the Government Departments concerned:—

Sir Frank Wills [*F.*], Member of District Selective Committee No. 8B (Bristol), under the Appointments Department of the Ministry of Labour.

Mr. J. W. Cockrill [*A.*], Member of the Production Committee for Housing Region M, under the Ministry of Health.

At the request of the Secretary of State for India the President has made the following nominations:—

Mr. S. Woods Hill [*A.*], as Consulting Architect to the Government of Bombay.

Mr. Harold Dicksee [*A.*], as Assistant to the Consulting Architect of the Province of Madras.

Mr. A. L. Mortimer [*A.*], as Assistant to the Consulting Architect of the United Provinces.

Mr. A. W. Graham Brown [*S.*] as Chief Assistant to Mr. R. E. Stewardson [*A.*], of Shanghai.

Changes of Address.

A new issue of the R.I.B.A. KALENDAR is in course of preparation. Members are particularly requested to send to the Secretary as soon as possible a notification of any changes of address they desire to have inserted.

The Royal Institute Library.

Members and Students are informed that from October 1st 1919 until June 1st 1920 the Library will be open from 10 a.m. till 8 p.m., and on Saturdays from 10 a.m. till 5 p.m.

The President's Visit to the Devastated Area.

Owing to a clerical error, it was stated in the last number of the JOURNAL that the President was accompanied by members of the Council. The invitation of the French Red Cross was a personal one, addressed only to the President and to Sir Banister Fletcher.

Mr. Ernest Newton and the Architects of Belgium.

The Central Society of Architecture of Belgium has conferred upon Mr. Ernest Newton, R.A., Past President, its honorary membership as a mark of gratitude for his services to exiled Belgian architects during the war.

Retirement of Mr. William Dunn.

Mr. Dunn has retired from practice and is about to proceed to the South of France in search of renewed health. A few of his friends in the profession joined in giving him a farewell dinner at Pagani's Restaurant before his departure. Among those present were Messrs. John W. Simpson [*President R.I.B.A.*], Henry T. Hare [*Past President R.I.B.A.*], H. M. Fletcher [*F.*], H. V. Ashley [*F.*], W. Curtis Green [*F.*], F. W. Troup [*F.*], Walter Millard [*A.*], E. Stanley Hall [*A.*], Maxwell Ayrton [*A.*], H. Brown.

City of Paris Extension Competition.

The President has received from the Prefecture of the Seine copies of the plans and documents relating to the Paris Extension Competition, which have been presented to the Library of the Royal Institute.

"Daily Mail" Ideal Home (Labour-Saving) Competition.

The closing date for sending designs in *The Daily Mail* Ideal (Labour-Saving) Home Architects' Competition, which was to have been October 4th, is indefinitely postponed. It will be announced in *The Daily Mail* when conditions are normal again.

"Technical Journals'" Reading Room.

The management of *Technical Journals* desires to call the attention of architectural students to the fact that at 29, Tothill Street, Westminster, a specially appointed reading-room has been started, to which they are cordially invited. In addition to the standard architectural works, visitors to the reading-room may consult any of the books in the library.

Professional Notices.

Mr. Martin Briggs [*F.*] has transferred his office to 88 Gower Street, W.C.1, near University College.

Mr. Arthur Knapp-Fisher [*A.*] and Mr. Lawrence Powell have entered into partnership, and will practise under the style of Knapp-Fisher & Powell at 33 Palace Street, Westminster, S.W.1. Mr. Knapp-Fisher has, in consequence, changed his address from 23 Old Buildings, Lincoln's Inn, to 33 Palace Street, S.W.1.

A demobilised officer desires a junior partnership with a firm of London architects. Qualified for Associateship, R.I.B.A. Apply, K. D. E., c/o Secretary R.I.B.A., 9 Conduit Street, W.1.

Associate R.I.B.A., with upwards of 20 years' general experience, especially schools and institution work, desires to meet another architect with view to partnership or purchase of practice. London or easy reach of London preferred, but not essential. Write, W. B. O., c/o Secretary R.I.B.A., 9 Conduit Street, W.1.